An Analysis of Workplace Training in Canada: Evidence from WES

by

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Author's declaration

I hereby declare that I am the sole author of this thesis. This is a true copy of the thesis, including any required final revisions, as accepted by my examiners.

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Abstract

With fast development of technology and globalization competition, firms today are in a changing environment. Skills obsolete quickly. To prevent the skill shortage, training has been given more and more attention. However, current literature has some gaps in examining the training determinants.

This thesis use the Workplace and Employee Survey (WES) data (1999 - 2005) to conduct research on the determinants of provision of training and training selection in Canada. The workplace data is a longitudinal panel data of seven waves while the employee data is linked to employer at the micro level. Training is first explored on the workplace panel data to capture the workplace determinants that decide training incidence and intensity. Then with these workplace determinants included, provided that different company train differently in regard of training incidence, employee's participation in training is investigated on the linked data. Heckman Two-step selection model is adopted to correct the selection bias which has not been properly addressed in most of the studies.

With the analysis results, determinants of training are identified. Profit, non-wage benefit and payroll are alternatives to training regardless of firm size. Firms train less if they are experiencing high turnover rate while more training will be provided if firms have larger proportion of professional and technical workers or undergo some organizational change. Employees with longer tenure, married people and female employees are the group of employees that have disadvantage in training. Classroom training is more sensitive for

immigrants and temporary workers. The negative effects are greater for classroom training than on-the-job training when those two variables are presented. Collective bargaining agreements only guarantee a large proportion of employees having the training opportunity while training intensity cannot be promised. In fact, small firms reduce their training expenditure while large firms increase investment in training when they are unionized. Several implications are also mentioned.

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Table of Contents

List of Tables

Chapter 1 Introduction

Influenced by the development of technology and global competition, firms today are facing a fast changing environment. Rapid technological change implies evolving changes in firms' skill demand, skill obsolescence and training needs (Acemoglu and Pischke, 1999). It requires both employers and employees to be adaptive. Firms can respond in a number of ways: introducing new technologies, re-organizing, or hire new employees etc. Based on human capital theory, knowledge, skills and abilities that people possess are an asset to the company (Becker 1994). However, most jobs require specific skills which cannot be provided by general-purpose education. Training becomes one of the main components of human capital. And it is an effective way for employees to meet the skill demand. In addition, Canadian companies have diverse workforce with various cultural background and education levels. Under such condition, training becomes particularly important to companies. Employers use training for three purposes: to increase the productivity or performance; to achieve organizational goals; to invest in workers to succeed in the unpredictable and turbulent business environment (Belcourt et al. 2000).

Provided with such importance, training is gradually paid special attention by researchers. What determines the training decision? To what extent do the training determinants affect its incidence? What factors decide the firm to train more than others? Who gets trained? These questions are generally asked in the studies. Thanks to the earlier literature, a certain group of workplace and employee characteristics are explored and results are inspiring. Yet most of the researches are conducted in a way that either workplace's or employee's perspective is

examined. What is missing in the current literature is the linkage between employee traits and workplace characteristics. Such a connection is necessary if we want to examine how employees would be affected by the event occurs at organizational level. Besides, similar research is conducted differently in countries. It is greatly restrained by the available survey data. Some characteristics which work well in other country's training model do not necessarily play the same role in Canadian companies. In addition, most researches did not give sufficient consideration over endogeneity problem and omitted variables bias. Without those problems being properly addressed, estimation results are compromised.

This thesis provides discussions from both workplace and employee perspectives. This allows us to look from the workplace side to examine what characteristics determine the training incidence. It also provides ways to explore why some firms spend more money in training while others relatively invest less in training. By linking the employee data to the workplace at micro level enables us to investigate what traits determine an employee ton receive more training than others, provided the difference of provision of training is counted.

Another contribution to the current literature is that this thesis adopted Statistics Canada's Workplace and Employee Survey (WES) data (1999-2005). Although some workplaces dropped out during the period, most of the surveyed locations are available for a seven waves' panel data estimation. By linking the employee data to the workplace, three sets of linked employer-employee data are created. Due to the survey design that same employees in a firm are only tracked for two years, this linked data cannot be a seven waves' panel data.

Therefore, each set of data is longitudinal for a period of two years, which are 1999 – 2000, 2001 – 2002, and 2003 – 2004. The advantage of conducting research with those data is that the endogeneity problem is properly addressed. Moreover, the Heckman Two-step selection model is adopted in this thesis. The Heckman procedure views the sample selection as an omitted variable, which is then included in the second stage's regression equation. With selection problem being taken care of, the omitted variable bias is also corrected.

The findings of this research reveal that profit, non-wage benefit and payroll are alternatives to training regardless of firm size. Firms train less if they are experiencing high turnover rate while more training will be provided if firms have larger proportion of professional and technical workers or undergo some organizational change. Employees with longer tenure, married people and female employees are the group of employees that are disadvantaged at training. Classroom training is more sensitive for immigrants and temporary workers. The negative effects are greater for classroom training than on-the-job training when those two variables are presented. Collective bargaining agreements only guarantee a large proportion of employees having the training opportunity while training intensity cannot be promised. In fact, small firms reduce their training expenditure while large firms increase investment in training when they are unionized.

This thesis is organized as follows. The next chapter presents the existing literature regarding training determinants. Chapter 3 describes the survey design, econometric model and the variables construction. Chapter 4 discusses the empirical results obtained from the analysis,

with some implications being provided. Finally, Chapter 5 presents the conclusions as well as proposed future research. Limitations of this study are also discussed.

Chapter 2 Literature Review

In the literature reviewed in this thesis, studies regarding different types of trainings are conducted. These most popular definitions of training are: General vs. Specific training; Formal vs. Informal training; Job-related vs. Career-development training; Employer-sponsored vs. Employer-supported training. Besides, some variables such as workplace characteristics and employee traits, which are theoretically believed to be affecting training, are examined empirically.

There are different types of training appeared in the literature. Although a number of studies examine these training types respectively, it causes some confusion and drawbacks which prevent the training types to be universally applied into all surveys. For instance, general training means providing knowledge and skills that can not only by used in the current job, but also benefit the future ones. Specific training, to the contrary, focus on knowledge and skills exclusively for the current position. It is not transferable to other jobs. Provided the fact that in most empirical cases, the boundary between general and specific training is vague, a US study by Lillard and Tan (1992) even found that transferability of training from most sources is diminished when new jobs are found in industries characterized by high rates of technological change. In this thesis, a different approach of defining training type is created by WES design. This survey focuses on the training location (classroom vs. on-the-job (OTJ)), by which the training was divided into two groups. Classroom training is closely related to formal training. It is by definition activities with a predetermined format,

predefined objectives, specific content and progress that can be monitored or evaluated. On-the-job training is the training provided when employees are at work.

A wide range of research regarding training effects on firm productivity and wages have been conducted. Most of them found strong evidence showing that training significantly boosts productivity. In a recent paper of Konings (2008), on-the-job training is found to increases firm level measured productivity between 1% and 2%. While the effect of training on wages is also positive, it is much lower than the effect on productivity. These results are consistent with the work of Conti (2005). Training, which is usually sponsored by firms, is therefore perceived as one of the most important measures to gain and retain productivity (Zwick, 2005). With such an important impact on organization's investment, it is well worth examining training's determinants. It is of general interests to examine which characteristics from employer determine the training decision. A certain set of explanatory variables for the training incidence and intensity are examined in literature.

Establishment Size

Firm size has been a popular control variable tested in literature. Large establishments usually are more inclined to train employees, because they are more likely to have their own training department and the fixed costs of training can be spread over a larger number of employees (Lynch and Black, 1998). This has been supported by many studies. Barron et al. (1987) found that large firms provide more training to new hires than smaller firms do. Similar result is also found in Frazis et al (1995). Barrett and O'Connell (2001) claimed no

significant relation between training costs and firm performance for a small sample of Irish firms. But the authors admit that the insignificance of the results may be due to measurement error. However, Zwick (2006) did not lend any support to the above theoretical explanation made by Lynch and Black (1998). In Zwick's work, he found that establishments with more than 20 employees train less intensively than establishments with less than 20 employees. In this thesis, the differences between small firms and large firms are also examined.

Industry

Industry would be an important control variable as different sectors have different services which require various levels of skills. In that case, training would differ a lot in both incidence and intensity. It is necessary to take into account the industry effect. Earlier literature has examined the effect of industry on training. Lynch and Black (1996) find that the percentage of formal training outside working hours is positive and significant for the manufacturing sector. The computer training was positive and significant in the nonmanufacturing sector. Recently, in Van de Wiele (2010), industry dummies were created (25 for manufacturing, 18 for non-manufacturing). The results suggest that training participation in chemical manufacturing is significantly higher than others while the manufacturers of wood and wooden products train less than other firms. Among those non-manufacturing firms, those that are involved in sales or business activities (computer services, R&D, etc.) train more while the training participation rate is significantly lower for land transport.

Technological Investments

Firms that invest in new technology, either through expansion or replacement of fixed assets, could be expected to gain a competitive advantage over firms that do not pursue the same actions. Investment in R&D could be seen as a proxy for innovation (Van de Wiele, 2010). With these R&D investments, workforce may in the need of training to adjust and get familiar to the new product or process, especially if firms invest in new equipment or software.

Ichniowski et al. (1997) use monthly data on the productivity of 36 steel finishing lines and find that moving from the most traditional system to the next most innovative system raises productivity by 2.5 in percentage and another 3.5 if the line moves up to the next most innovative system. Large investments in physical capital and R&D, as well as the adoption of new forms of work organization also tend to encourage higher percentages of employees to be given formal training (Asplund, 2004). Although Bartel and Sicherman (1995) demonstrate that technological change does not increase the training length represented by hours spent in training, their next paper (Bartel and Sicherman, 1998) using US data of young males employed in manufacturing, finds that the rate of technological change is positively associated with training received by production workers. Similarly, state-of-the-art technical equipment is found to induce training as shown by Dearden, Reed, and Van Reenen (2000), Gerlach and Jirjahn (2001), and Zwick (2006). One of Bresnahan, Brynjolfsson and Hitt (2002)'s findings is that companies with high levels of information technology and workplace organization invest highly in training.

According to the literature, a group of variables regarding technological investments will be tested:

-*Hypothesis 1:* Technological investments will be positively associated with training incidence.

Turnover

Both human capital and internal labour market theories predict a negative relationship between specific training and turnover (Asplund R. 2004). For example, human capital model (Becker, 1964) predicts that both employees and employers have an incentive to maintain a long-term employment relationship in order to realize a return on their shared investment.

The current literature studies association of turnover and training from two perspectives. One is regarding the relationship between training and subsequent turnover. The other one is about the impact of turnover on training. Due to the availability of WES data, we can only investigate the impact of firm's turnover rate on training. The previous research about the impact of turnover on training suggests the higher the average quit rate in a UK industry, the less likely a full-time male employed in the industry to receive general training, and the fewer the training days are(Booth, Francesconi and Zoega, 2003). This finding is also in line with the results found by Frazis, Gittleman and Joyce (2000) on a US establishment-level data. Thus, we hypothesize that:

-*Hypothesis 2:* Higher turnover rate will reduce the training incidence.

Human Resource Practices

Training is closely correlated with other personnel measures that increase the participation of employees. Human resource practices influence employee skill via the acquisition and development of a firm's human capital. Huselid (1995) used survey data on 968 firms to evaluate the links between systems of High Performance Work Practices and firm performance. The human resource policies were grouped as employee skills & organizational structure (selection, information sharing and quality of work life) and employee motivation (pay-for-performance, promotions based on merit or seniority). The results suggest that the employee skills and organizational structure were significant for the gross rate of return on capital. Whitfield (2000) showed that the average of training length (in days) per employee is positively correlated with the introduction of participative personnel measures.

Professional and Technical Workforce

Booth and Zoega (2000) found that firms with a higher quality workforce and more complex tasks have a higher incentive to invest in training because they can skim monopsony rents. In Zwick's (2004a, 2006) papers, training incidence increases with qualification. Establishments with a larger share of qualified employees tend to train more.

Union

The unionization is an important variable examined in the literature. Acemoglu and Pischke (1998, 1999) suggest that unionization, or any other imperfections of the labour market that contribute to reducing the distribution of wages, may encourage firms to fund general

training because it increases the cost for workers to move to other firms. Moreover, unions can also encourage employer's investment in training by communications between the parties and reducing employee turnover (Freeman and Medoff, 1984). Collective wage agreements also frequently entail training (Zwick 2006; Boheim and Booth 2004; Zwich 2004b). But there are also opposite opinion such as what Frazis, Gittleman and Joyce (2000) found. They reported that non-unionized US establishments provide more training to their employees than their unionized counterparts.

Age

Workers take training based on the analysis of the cost/benefit ratio of training. The factors that increase training costs or reduce benefits would have a negative impact on training participation (Cloutier, Renaud and Morin, 2008). Employees with different age would present different attitude towards change undergoing in workplace. Thus, training cost and benefits would be different for employees with various ages. As Anja and Michael (2006) point out that training participation varies with age: 30 - 45 year old employees receive most training, older worker participate less. The study of Arulampalam, booth and Bryan (2003) reveals that negative correlation between age and training selection for men, but not for women.

Education

Education is another important factor in human capital theory. It is also considered having great impact on employees' training. A broad range of researches come to a similar

conclusion that employee's education level increases the training probability substantially. The higher the qualification level of employees, the higher the return from training is. Therefore, establishments with a larger share of qualified employees tend to train more (Zwick, 2004a). Although in accordance to Lynch and Black (1996), Van de Wiele (2010) uses fixed effect estimation method finding a significantly positive relationship between employees' educational level and the 'fixed effect', the industry variables were just separated by manufacturing and non-manufacturing firms. Further detailed stratified industry variables are needed to explore the differences among diversified business sectors. With the available information from WES, it is possible for us to conduct estimation controlling for 14 categorical industries. So, we construct a hypothesis based on this:

-*Hypothesis 3:* Education level is positively linked with training participation.

Occupation

Studies that used employee surveys also found that training incidence and intensity vary by occupation. They typically increase when employees are moving up the hierarchical ladder (Pischke, 2001). Bartel (1995) used the 1986-1990 personnel records of a large manufacturing company which has 19,000 employees to estimate training incidence. The likelihood of receiving training was a function of an employee's relative status (employee's salary divided by the average salary of other employees) and other characteristics such as education, tenure on the job, tenure in the company and the source of hire. Strong evidence indicates that training (core and technical) is awarded to those individuals who stand out among their peers. And "remedial" training (employee development) is targeted to those

individuals who have low relative status in their jobs. Although this "relative status" provides a new perspective to explore the training incidence determinant, different occupations themselves have different activities, and different level of salary. To fix this, we use occupation and salary variables to control for this difference. In that way, we can investigate how the salary would affect the training incidence provided that industry is controlled. Moreover, Bartel's data only contains one single company in manufacturing sector. In this thesis, WES enables us to compare among diverse industries which involves thousands of companies.

New Hires and Tenure

Several studies also looked at the impact of tenure on training selection. As Zwick and Kuckulenz (2005) found that newly hired employees are exposed to more training than employees with longer tenure. In Zwick (2006)'s following paper which uses the establishment panel data from Institute for Employment Research (IAB), the share of newly hired employees is also added into the training intensity equation estimated by instrumental variables approach,. However, the ratio of newly hired employees showed an insignificant negative relationship with training intensity. It is reasonable to predict that with more new employees been hired, organizations would be expected to provide more training for those newly hired to get adapted to the workplace. But after they have worked in the same company for certain period of time, hence longer tenure, employees should be expected to gradually receive less training than the new workers.

-*Hypothesis 4:* The larger the proportion of newly hired employees, the more training will be provided.

-*Hypothesis 5:* Employee's tenure will be negatively related to training selection.

Other determinants

Other individual characteristics are also examined in the literature. Country-specific studies often indicate that being a woman means a significantly lower probability of receiving company training and, if participating, the length of training is likely to be significantly shorter than men's. Women, particularly those with children, are less likely to receive training than men (Blundell, Dearden and Meghir 1996; Pischke 2001). Nevertheless, for training participation rates, OECD (2003) found no significant differences between genders. Foreigners and workers at age above 40 are found to receive less training in the research conducted by Pischke (2001). Kuckulenz and Zwick (2003) found with German data that employees with temporary contract profit less from training. Ethnic-minority male employees are found to have a lower training incidence, but not for women (Blundell, R. et al, 1999). Similar correlation is also detected in Arulampalam, Booth and Bryan (2003), but they found it just for men in most of the European countries.

Empirical studies that examine the determinants of training have been constrained by survey design and data limitations. Most of the studies only focus on either employer or employee data. Those employer-based surveys on training do not usually include enough information on average employee characteristics such as education and age while the individual-level

surveys are lacking some measurements of workplace characteristics such as firm size and human resource practice. With the available WES data from Statistics Canada, Canadian researchers have the advantage of having both workplace and employee characteristics in estimating the training event.

Yoshida and Smith (2005) conducted research by using WES cross-sectional data from both the year of 1999, and the 1999/2000 employee panel with controls from the 1999 workplace survey. They analyzed the earnings differentials between visible minority immigrants and the native-born, as well as the role of discrimination in producing the earning difference. In their research, visible minority immigrants are found disadvantaged in both access to training and earnings. But education reduces the disadvantage.

Later, Zeytinoglu and Cooke conducted several studies regarding on-the-job training. They worked with Jiao (2005) by linking the 1999 WES employee data to employer's to examine the extent of on-the-job training and its determinants. Their results suggest that only temporary full-time workers have lower incidence of on-the-job training as compared to regular full-time workers. Other characteristics do not have any effect on training access; yet gender and ethnicity are significant factors (females receive fewer days of training compared to male workers; Aboriginals receive longer days of training compared to Whites). Their work provides us with information regarding the effect of ethnicity factors, but only for on-the-job training.

In the meantime, Zeytinoglu and Cooke (2005) used the same linked data to examine the effects of implementing new information technology, innovation, and competition experienced by the workplace as determinants of on-the-job training via multivariate logistic regression. Results showed that implementing new information technology, introduction of innovation, and the competition level of the workplace positively affect the incidence of on-the-job training. After controlling for a range of other variables, multivariate results showed that the interaction of these variables affect the incidence of on-the-job training.

Later, Zeytinoglu, Cooke, and Harry (2007) used the WES 2001 employee micro data linked to workplace micro data to study the effect of age associated with on-the-job training. They found that older workers are significantly (by 40%) less likely than middle aged counterparts to receive on-the-job training; those employed in innovative workplaces are more likely receive on-the-job training although effect is small; less educated workers or those with dependent children are less likely to receive on-the-job training as well; managers/professionals are significantly more likely to receive on-the-job training; low-paid workers are significantly (30%) less likely than higher-paid to receive training. Although their study considered the characteristics from both employer and employee perspectives, they only focused on the training incidence. While the incidence of on-the-job training is important, ideally this would be supplemented by other measures, such as training quality or intensity.

Further, Zeytinoglu, Cooke, Harry and Chowhan (2008) used the WES 2001 linked data to provide evidence of on-the-job training for low-paid workers in Canada and examine workplace and individual factors associated with their on-the-job training. After applying the multivariate regression analysis, results showed that less than a quarter of low-paid workers received on-the-job training in 2001 as compared to one third of higher-paid workers. This substantive gap is statistically significant. Inspired by their research, we include classroom training in our study.

-*Hypothesis 6:* Being a visible minority or immigrant, employees will have more barriers to the access of training.

Most recently, Cooke, Zeytinoglu, and Chowhan (2008) expanded their interests in all training types to explore the receipt of employer-supported training among these potentially vulnerable workers. By using the WES 2003 and 2005 data in multivariate regressions, evidence suggests that women were less likely to receive employer-supported training (about 93% as likely as men), although the effect was not statistically significant. Low-wage, less-educated and non-union women were all less likely to receive training. The receipt of training varies not only on the basis of gender, but also on wage, education, unionization, employment status, occupation, workplace tenure, worker age, and industry.

Cloutier, Renaud, and Morin, (2008) conducted research by using WES 2003 employee data to identify predictors of participation in voluntary vocational training for female and male managers separately. They defined the voluntary vocational training as any career-related

courses not sponsored by employers. The logistic regression method was applied. Their results indicate that for men, schooling is the sole human capital variable significantly linked to the probability of participating in voluntary vocational training. For women, it varies by age, organizational tenure and schooling. Participation in mandatory training and family responsibilities are showing significantly negative linkage to participation in voluntary training for female managers, but not for male managers. The major limits of their study were that they mainly focused training courses that are not sponsored by employers, and they only used a single wave data from employee perspective, which might not provide accurate information on training.

Quinlan (2008) examined the determinants and rewards of women's job related training by applying structural equation modeling on WES data. She found that for women, the strongest determinant of training is their occupation while for men is their previously acquired human capital.

Turcotte, Leonard, and Montmarquette (2003) conducted research by using the 1999 WES data. Their studies cover three aspects: (1) determinants of classroom and on-the-job training incidence; (2) determinants of training intensity; (3) determinants of worker participation in training. They first use a bivariate probit model on only the employer data to estimate the determinants of the incidence of classroom and on-the-job training separately. Their findings are: employers who support classroom training are also more likely to support on-the-job training; many workplace characteristics have a high influence on the probability of

providing classroom and on-the-job training, such as firm size, business strategies, and innovation or new technologies; non-profit purpose, average payroll per employee only have a positive effect on the probability of sponsoring classroom training; other characteristics such as turnover rate or the vacant position ratio have a greater impact on sponsoring on-the-job training; differences are also confirmed for the region, industry and occupational distribution variables.

Moreover, with the same dataset, they use a linear regression model corrected for selection bias (Heckman two-step) to study the determinants of the proportion of employees trained. By constructing the dependent variable as natural logarithm of the percentage of workers who received classroom/on-the-job training, same independent variables about workplace characteristics (same as those used in modeling the incidence of training) are applied. They found that new software or new technologies lead to larger proportion of workers receiving both classroom and on-the-job training. Business strategies and collective bargaining play an important role in classroom training. Turnover rate and the vacant positions ratio have a positive, yet decreasing impact on the intensity of on-the-job training. Occupational and regional variables also show different influences while the latter is for on-the-job training only. Surprisingly, unlike most of studies, the size of the location appears to have a negative effect on the proportion of employees trained.

Later, Turcotte, Leonard, and Montmarquette (2003) applied a bivariate probit model to the linked employer-employee data of year 1999 to examine the determinants of worker

participation in training. Computer use, permanent workers and education are found to be positively associated with all training types. Occupation appears to be significantly affecting classroom training, but not much on the probability of taking on-the-job training. Part-time workers are less likely to take classroom training than full-time employees while it has an insignificant negative effect on the probability of taking on-the-job training. Collective bargaining does not have a significant effect on classroom training but a small positive and significant effect on the other one. Locations still play a major role in taking trainings. Yet gender plays no effect.

-*Hypothesis 7:*Part-time or temporary workers have fewer training opportunities.

To sum up, existing literature provided some insights regarding training determinants. But they have some limitations either on data or methodology. Most of them use dataset that only contains workplace or employee information. And the available data is just a record for single year. This prevents us from thoroughly exploring the real determinants of training. Another major drawback is that most of the models they chosen didn't address the endogeneity problem. Although some of the researches conducted in Canada use WES data to link employer and employee at person level, they only linked for a year's wave. The unobserved heterogeneity was not taken into account. Moreover, sample selection bias was not properly addressed neither. Sampling bias is systematic error due to a non-random sample of a population, causing some members of the population to be less likely to be included than others, resulting in a biased sample. This can also be viewed as omitted

variable bias. As a result, it leads to biased estimators. We will discuss about this in detail in later chapter.

This thesis contributes to the current literature firstly by introducing an employer panel data for up to 7 waves as well as three sets of employer-employee linked micro data with two years' consistency of each. This will enable us to conduct estimation on a larger range of variables to test the proposed hypothesis. Secondly, we address the endogeneity problem by using Heckman two-step selection model on longitudinal datasets. With Heckman procedure, selection bias is properly taken care of. Unbiased estimators are therefore obtained.

Chapter 3 Data and Methodology

3.1 Survey Design

The data used in this thesis is from Workplace and Employee Survey conducted by Statistics Canada. This survey uniquely linked employers and employees at micro data level. The event can be analyzed not only by the workplace characteristics, as other firm level surveys have done, but also by exploring the characteristics from workers. WES was initially conducted in the year of 1999, during the summer for the employer survey part while the fall for the employee survey.

The employer samples are drawn from the Business Register (BR) maintained by the Business Register Division of Statistics Canada. The target population for the employer component is defined as all business locations operating in Canada that have paid employees in March, with the following exceptions: a) Employers in Yukon, Nunavut and Northwest Territories; and b) Employers operating in crop production and animal production; fishing, hunting and trapping; private households, religious organizations and public administration (Statistics Canada, 2002).The employer data is longitudinal, which means the sampled business locations are repeatedly surveyed for 7 years. The initial sample is supplemented at two-year intervals for adding new units. The survey was first collected in person in 1999, and then conducted by computer assisted telephone interviewing (CATI) the managers from each location for the following years. The workplace survey provides information about following workplace characteristics:

Technology implemented;

Operating revenues and expenditures, payroll and employment;

Business strategies;

Unionization;

Compensation schemes;

Training provided;

Mix of full-time/part-time, contract, and temporary employees;

Organizational change;

Subjective measures of productivity, profitability;

Type of market in which firm competes.

The target population for employee component is sampled workers from each locations answered the questionnaire via telephone. As workers may change work locations easily, employees were followed only for two years. This creates the employees data into three independent datasets, each of them is longitudinal of two years' wave. A maximum of twenty four employees are sampled using a probability mechanism. In workplaces with fewer than four employees, all employees are selected (Statistics Canada, 2004).This part of survey covers questions about the worker characteristics as follow:

Education;

Age/gender;

Occupation, management responsibilities,

Work history, tenure;

Family characteristics;

Unionization;

Use of technology

Participation in decision making;

Wages and fringe benefits;

Work schedule/arrangements;

Training taken.

In 1999, 9,043 business locations were selected from Business Register with number growing to 13,147 business locations in 2003. The workplace response rates are 95.2% for 1999, 90.8% for 2000, 85.9% for 2001, 84% for 2002, 83.1% for 2003 and 81.7% for 2004. The response rates for employee survey are in the range of 82.7% to 90.9% over these years. Compared to other firm level surveys that have relative lower response rate, WES survey provides us with more information and accuracy in analyzing event.

The data collection, data capture, preliminary editing and follow-up of non-respondents are all done in Statistics Canada Regional Offices. Similar to other surveys, sampling error and part of the non-response and frame errors cannot be avoided. By introducing estimation weights (final weights and workplace link weight) to each sampled unit, these issues have been properly dealt with.[1]

[1]In this thesis, the Heckman Two-step Selection model is adopted. This model does not allow using weight. So those weights are only used in the descriptive statistics tables.

3.2 Workplace and Employee Linkage

Although the survey data provides possible ways to examine the longitudinal and linked workplace and employee data, they are not presented in the longitudinal or linked format. In current literature, what is missing is the linkage of employees' characteristics to events taking place in firms. Such a connection is necessary to understand the association between labour market changes and demand-side pressures, which stem from global competition, technological change, and the drive to improve human capital, among other things. Thus, one primary goal of the WES is to establish a link between events occurring in workplaces and the outcomes for workers. A seven years' longitudinal dataset for employers is created and employer-employee linked datasets are built for the year of 1999 to 2004.

The employers surveys from 1999-2005 were linked by DOCKET, the establishment level identifier variable. Establishments were sorted by DOCKET in each of the seven surveys and the files were then merged (not-for-profit establishments were excluded). By this method, we can keep the establishments that had remained in the sample frame for the full waves in the linked data file. The initial link resulted in 22,860 observations and 3,810 establishments. However, some of the establishments had IT expenses that exceeded their total revenues in a given year, or they had reported more computer users than employees. These establishments were deleted from the file. After cleaning, the total observation fell to 22,805.

For the linkage of employer and employee data, due to the survey design that employees are only followed for two years, we have to create three distinguish linked datasets with each dataset longitudinal for two years. This forms the 1999 to 2000 (99_00), 2001 to 2002 (01_02), 2003 to 2004 (03_04) longitudinal data.

Employers are uniquely identified by the variable DOCKET while employees have an identifier variable SEQ_NO within their workplace. We concatenate the information of DOCKET and SEQ_NO together to present a unique identifier variable for each employee in this dataset. There are three major steps to complete this linkage action. Taking 99_00 dataset as an example: first we have to sort by DOCKET for both samples, and merge the 1999 employer and 1999 employee data together to generate the linked 99_99 data; then same procedure is applied to the 2000 employer and employee data to obtain the linked 00_00 data; lastly, sorting by DOCKET and SEQ_NO, these two linked datasets are merged together to create the 99_00 dataset. A new identifier variable is generated by concatenating the values of DOCKET and SEQ_NO.

With this procedure, the two years' wave longitudinal datasets are obtained. Employees have their individual information for two years, with the corresponding employer information being linked for those years. This merge procedure automatically excludes the employees who have not been followed in the consecutive year. This resulted in 43,097 observations for 1999 - 2000, 35,476 observations for 2001 - 2002 and 36,760 observations for 2003 - 2004. Table 1 below shows the detailed information.

Table 1. Number of observations

	Employers	Employees	Linked
1999	23, 540	6, 271	43, 097
2000	20, 167	6, 018	N*: 5, 700 (employer) 23, 200 (employee)
2001	20, 352	6, 102	35, 476
2002	16, 813	5, 713	N*: 5, 200 (employer) 19, 450 (employee)
2003	20, 834	6, 503	36, 760
2004	16, 804	6, 098	N*: 5, 250 (employer) 20, 350 (employee)

*The number of employers and employees are rounded to base 50 due to Statistics Canada's disclosure regulation.

Based on previous literature, establishment size exerts great influence on employer provided training. To explore the different impacts on training incidence between small size and large size companies are of special interest to us. So the employer longitudinal samples are divided by firm size. We use the criterion that defines small size company by total employee number with no more than 75. As for the large size firm, we define it as having more than 250 employees. After applying the rules, the samples for small company are 15,239 observations for seven waves. The large firm samples are composed of 2,689 observations in total.

These datasets allow us to examine the determinants of employer-provided training from the seven waves' employer panel data. Workplace characteristics that influence organization's training decision can be detected. In addition, with those linked datasets, we can further explore how worker's access to training is affected by both employee traits and workplace factors which have been previously detected.

3.3 Methodology

Empirical studies of panel data have a general concern for unobserved heterogeneity. Failure to account for some individual-specific attributes may result in biased and inconsistent estimates of the parameters of interest. In linear panel data models, these unobserved effects may be "differenced" out, by using the familiar "within"("fixed-effects") approach. This method is generally not applicable in limited dependent variable models (Kyriazidou 1997). According to previous research, endogeneity problem and selection bias are endemic major issues that simultaneously presented. But most of the researches didn't properly address these issues.

Heckman (1979) stated that selection bias is resulted from using non-randomly selected samples to estimate behavioral relationships as an ordinary specification bias that arises because of a missing data problem. In the analysis of sample selection bias, it is possible to estimate the variables which when omitted from a regression analysis give rise to the specification error. He also mentioned that sample selection bias usually arise in practice for two reasons. First, there may be self selection by the individuals or data units being investigated. Second, sample selection decisions by analysts or data processors operate in much the same fashion as self selection. In WES data, the training functions estimated on this selected samples do not actually estimate the population training event. That is also because the data might not be randomly selected as panel data studies are commonly using observations that are followed for the whole waves.

Previous work has corrected the endogeneity problem by instrumental variables estimation as Kuckulenz and Zwick (2003) did, or fixed effects approach by Pischke(2001). In this thesis, Heckman two-step selection model is adopted. This procedure not only captures our training theory appropriately, it is also more efficient and robust than competing procedures. It is the only consistent estimator given the truncated distribution of the sample in the second stage (Plumper, Schneider and Troeger, 2005). In the following, Heckman two-step selection model is presented.

The Heckman model is composed of two stages. First, is the probit model to estimate event incidence. Second stage is the outcome OLS regression. For observation i, the probit selection equation at stage 1 is:

$$z_i^* = \mathrm{w}_i\gamma + \mathrm{u}_i \quad (1)$$

$$z_i = \begin{cases} 1 & \text{if } z_i^* > 0 \\ 0 & \text{if } z_i^* \leq 0 \end{cases} \quad (2)$$

Prob (Z = 1|W) = Φ (Zγ), where Z indicates the event occurring, which in this study, training provided. (Z = 1 if the training is provided and Z = 0 otherwise), W is a vector of explanatory variables, γ is a vector of unknown parameters, and Φ is the cumulative distribution function of the standard normal distribution.

A normality assumption was involved as

$$u_i \sim N(0, 1)$$
$$\varepsilon_i \sim N(0, \sigma^2)$$
$$\rho = \text{corr}(u_i, \varepsilon_i)$$

And the outcome equation would be:

$$y_i^* = \begin{cases} x_i\beta + \varepsilon_i & \text{if } z_i^* > 0 \\ - & \text{if } z_i^* \le 0 \end{cases} \quad (3)$$

where y^* denotes the training intensity, which is not observed if the employer-provided training is not detected for this observation. The conditional expectation of outcome (training intensity) given the training provided in this observation is calculated as

$$\begin{aligned} E[y_i \mid y_i \text{ is observed}] &= E[y_i \mid z_i^* > 0] \\ &= E[x_i\beta + \varepsilon_i \mid w_i\gamma + u_i > 0] \\ &= x_i\beta + E[\varepsilon_i \mid w_i\gamma + u_i > 0] \\ &= x_i\beta + E[\varepsilon_i \mid u_i > -w_i\gamma] \end{aligned} \quad (4)$$

The selection bias arises when estimating β if ρ not equals to 0, which means there exists correlation between the unobserved determinants of event selection (training incidence) and the unobserved determinants of outcome (training intensity). If $\rho \neq 0$, then the truncated mean is no longer $x_i\beta$, selection has to be taken into account. As Greene (2003, 782) notes,

$$E[\varepsilon_i \mid u_i > -w_i\gamma] = \rho\sigma_\varepsilon\lambda_i(\alpha_u) \quad (5)$$

where $\alpha_u = \dfrac{-w_i\gamma}{\sigma_u}$, $\lambda(\alpha_u) = \dfrac{\phi\left(-w_i\gamma / \sigma_u\right)}{1-\Phi\left(-w_i\gamma / \sigma_u\right)} = \dfrac{\phi\left(w_i\gamma / \sigma_u\right)}{\Phi\left(w_i\gamma / \sigma_u\right)}$.

Thus, the Heckman conditional mean is:

$$
\begin{aligned}
E\left[y_i \mid y_i \text{ is observed}\right] &= \mathrm{E}\left[y_i \mid z_i^* > 0\right] \\
&= \mathrm{E}\left[x_i\beta + \varepsilon_i \mid w_i\gamma + u_i > 0\right] \\
&= \mathrm{x}_i\beta + \mathrm{E}\left[\varepsilon_i \mid w_i\gamma + u_i > 0\right] \\
&= \mathrm{x}_i\beta + \mathrm{E}\left[\varepsilon_i \mid u_i > -w_i\gamma\right] \\
&= \mathrm{x}_i\beta + \rho\sigma_\varepsilon \left[\frac{\phi\left(w_i\gamma \big/ \sigma_u\right)}{\Phi\left(w_i\gamma \big/ \sigma_u\right)}\right] \\
&= \mathrm{x}_i\beta + \rho\sigma_\varepsilon\lambda_i\left(\alpha_u\right) \\
&= \mathrm{x}_i\beta + \beta_\lambda\lambda_i\left(\alpha_u\right)
\end{aligned}
\tag{6}
$$

where λ is the inverse Mills ratio evaluated at wγ. Then, we now have

$$
\begin{aligned}
y_i \mid z_i^* > 0 &= \mathrm{E}\left[y_i \mid z_i^* > 0\right] + v_i \\
&= \mathrm{x}_i\beta + \beta_\lambda\lambda_i\left(\alpha_u\right) + v_i
\end{aligned}
\tag{7}
$$

This clearly illustrates that if only apply OLS on second stage equation, without taking into account of the selection bias, it will lead to biased and inconsistent estimates because the variable $\beta_\lambda\lambda_i\left(\alpha_u\right)$ is omitted. This demonstrates Heckman's insight that sample selection can be viewed as a form of omitted-variables bias, as conditional on both X and on λ it is as if the sample is randomly selected. The outcome equation can be estimated by replacing γ with probit estimates from the first stage, constructing the λ term, and including it as an additional explanatory variable in linear regression estimation of the second stage equation. Since $\sigma_\epsilon > 0$, the coefficient on λ can only be zero if ρ = 0, so testing the null that the coefficient on λ is zero is equivalent to testing for sample selectivity (Wikipedia website).

3.4 Measures

The WES survey includes several questions regarding training. This thesis mainly focuses on the incidence and intensity of classroom/on-the-job training provided by workplace. We study the provision of training from the employer panel data while the linked employer-employee datasets are prepared for investigating the receiving of training.

The Provision of Training

In order to compare between different types of training, we include three dependent variables for stage 1 probit estimation. They are classroom training incidence, on-the-job training incidence and any training (either classroom or on-the-job) incidence. For example, we use the question of "Between April 1st YYYY and March 31st YYYY, did this workplace pay for or provide any of the following types of classroom job-related training? (Check all that apply)" for classroom training incidence. If the employer responded as "No" for "No classroom training" category, then it is counted as a classroom training incidence for this observation. Similar question is applied to on-the-job training. Training intensity is represented by training expenditure per employee in each year, which is the dependent variable for the second stage regression.

It is important to take sufficient control variables into account to avoid omitted variable bias in the estimation (Huselid, 1995). Van de Wiele (2010) pointed out that in survey based research, variables that refer to management and leadership style or strategy can be included. Hence, in this thesis, independent variables are created by questions regarding workforce

characteristics, separations, compensation, training, organizational change, collective bargaining, workplace performance, business strategy, innovation and technology use for employer analysis.

Computer use variable is created as proportion of computer users to the total employees. Same approach is used to get the proportion of professionals and technical employees, proportion of quitting employees, proportion of new hired employees, and proportion of employees covered by collective bargaining agreement. We use a binary variable to state that whether this organization introduced any new software or computer control technology over this year. Innovation variable is defined as 1 represents new product or process is introduced while 0 means not. Since there have been some discussion about the impact of organizational change to training, we introduced a organizational change variable which is defined by the question of "Has your workplace experienced any of the following forms of organizational change between April 1, YYYY and March 31, YYYY?". There are 15 kinds of change on the list. This variable is generated by adding up all the checked categories, and then divided by 15. By doing this, we can investigate whether more changes would evoke more training. Similarly, the human resource practice variable and incentives variable are all created in this way: adding up all the checked categories and divide them by their total number. Besides, there are variables indicating the average profit per employee, expenditure on non-wage benefit per employee and payroll per employee. Their definitions are straightforward. We introduced a variable for technology cost - the cost of most recent software/hardware/computer control/computer assist technology. Dummy variables for

industry are also included. Although some literature suggested the regional effect, the region variable is only available in Statistics Canada's head office in Ottawa. For this thesis, the variable regarding region information is unfortunately not accessible.

The Receiving of Training

This estimation is based on both workplace and employee characteristics. The workplace variables are kept identical for the probit selection model. Other variables regarding employee information of job characteristics, training and development, compensation and demographics is applied in the model estimation.

The dependent variables for the first stage probit estimation are classroom training and on-the-job training incidence inherited from above workplace training model. For the second stage to examine the training intensity, training length variables of classroom and on-the-job training are kept separately. The questions relate to classroom training intensity is "How long was the course? Last course + Second most recent course". And "In the past twelve months, how much time in total was spent for on-the-job training?" is used to create the on-the-job training intensity. Unlike some existing researches using "How many days was the training", we use "hours" as the unit to measure training length instead. Some binary independent variables such as marital status, the presence of children and whether the employee is female are replicated from earlier studies. Age groups are created to measure the relationship of training intensity and people of different ages. Similar to most studies, we use a dichotomous variable regarding unionization. Studies also suggest that employee's tenure plays a role in

their training participation. Thus, by including the tenure variable which is measured by the length (in years) of working in this company, this determinant can be tested. Job characteristics variables such as part-time and temporary job are also examined. Based on the theory in this thesis, part-time employees have smaller possibility to be provided with firm sponsored training. Temporary employees are theoretically receiving less training as their working hours is relatively fewer than regular workers. Education background is also a variable that has been taken into account for this matter. The school-year variable is created to measure how many years of school has this employee attended, referring to the education level answered in the survey. According to literature, occupation is a strongly suggested variable to be added into the equation. Therefore, we include dummy variables for the six occupation groups defined by WES. Lastly, as Canada is a multicultural country, yet not many research paid attention to the immigration and ethnical factors, it is suggested that ethnical group of employees may be influenced regarding receiving employer sponsored training. Therefore, this thesis measures immigration variable as 1 if employees indicate they are not born in Canada plus the answer of "In what year did you immigrate to Canada" is provided. As for ethnical variable, we create a binary variable called visible minority. A value of 1 is assigned if employee's ethnical group falls into any of the following categories: Arab, Black, Chinese, East Indian, Filipino, Inuit, Japanese, Korean, Latin American, Métis, North American Indian, North Africa, South East Asian and West Asian. The definitions of variables used in our model are illustrated in table 2 and table 3:

Table 2. Employer Variables

Employer		
Variables	**Description**	**Questions**
Dependent Variables:		
clsr_trng	Binary variable. Equals 1 if this company provided classroom training during this year.	Q14 (a): Between April 1st YYYY and March 31st YYYY, did this workplace pay for or provide any of the following types of classroom job-related training? (Check all that apply) No classroom training
otj_trng	Binary variable. Equals 1 if this company provided on-the-job training during this year.	Q16 (a): Between April 1 YYYY and March 31 YYYY, did this workplace pay for or provide any of the following types of on-the-job training? (Check all that apply) No on-the-job training
trng	Binary variable. Equals 1 if any (classroom or on-the-job) training is provided	Q14(a) + Q16(a)
trng_exp	Training expenditure per employee	Q15 (a): Please estimate this workplace's total training expenditure, between April 1 YYYY and March 31 YYYY. (Q15(a)/total employment)
Independent Variables:		
revenue	Gross operating revenue	Q29 (a): For this same fiscal year, what was the gross operating revenue from the sale or rental of all products and services for this location?
cpu	Proportion of computer users	Q43: At this location, how many employees currently use computers as part of their normal working duties?

(Continued on next page)

Table 2. Continued

Employer		
Variables	**Description**	**Questions**
prof_tech	Professionals and technical employees as percent of all employees	Q1(e): Of the total of Non-management employees NOT COVERED by a collective agreement reported in Q1(d)c, how many were in the following categories: full-time professionals/technical + part-time professionals/technical; +Q1(f): Of the total of Non-management employees COVERED by a collective agreement reported in Q1(d)c, how many were in the following categories: full-time professionals/technical + part-time professionals/technical;
tech	Binary variable. Equals 1 if either new software or computer control technology is implemented.	Q44 (a): Between April 1, YYYY and March 31, YYYY, has your workplace implemented a major new software application and/or hardware installation? +Q45(a): Between April 1, YYYY and March 31, YYYY, has your workplace implemented a computer-controlled or computer-assisted technology?
org_chg	Add up all checked organizational change categories and divided by 15	Q20: Has your workplace experienced any of the following forms of organizational change between April 1, YYYY and March 31, YYYY?
turnover	Proportion of quitting employees	Q5 (a): Please estimate by reason the number of employees who have permanently left this location between April 1, YYYY and March 31, YYYY. Resignations, Lay-offs, Special workforce reductions, Dismissal for cause, Retirement and other separation.
innovs	Binary variable. Equals 1 if either new product or process is introduced.	Q40: Between April 1, YYYY and March 31, YYYY, has this workplace introduced... New processes or New products

(Continued on next page)

Table 2. Continued

Variables	Description	Questions
n_hire	Proportion of new hired employees	Q3 (a): Were there any new employees hired between April 1, YYYY and March 31, YYYY?
profit	Profit per employee	Q29 (a): For this same fiscal year, what was the gross operating revenue from the sale or rental of all products and services for this location? Q30(a): What was the gross operating expenditure for this location for the most recently completed fiscal year?
wage	Payroll per employee	Q7: What was the total gross payroll for all employees at this location between April 1, YYYY and March 31, YYYY?
hrm	Add up all checked HRM practices and divided by 6	Q18: For non-managerial employees, what year were the following practices implemented on a formal basis in your workplace? Employee's suggestion program, Flexible job design, Information sharing with employees, Problem-solving teams, Joint labour-management committees and self-directed work groups.
incens	Add up all checked incentives categories and divided by 5	Q6 (a): Does your compensation system include the following incentives? D. Merit pay or skilled based pay. Group incentives systems, Individual incentive systems, Merit pay or skill-based pay, Profit sharing plan and employee stock plans.
benefit	Expenditure on non-wage benefit per employee	Q11: What was the total expenditure on non-wage benefits at this location between April 1, YYYY and March 31, YYYY?
union	Proportion of employees covered by collective bargaining agreement.	Q1(c): Number of employees covered by a collective agreement

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Table 2. Continued

Variables	Description	Questions
tech_cost	Cost of most recent software/hardware/computer control/computer assist technology.	Q44 (b) + Q45(b): : What was the approximate cost of implementing this new software or hardware to this workplace?
ind_1	Dummy variable. Equals 1 if the company is in Forestry, mining, oil, and gas extraction	WES Industry Aggregation
ind_2	Labour intensive tertiary manufacturing	WES Industry Aggregation
ind_3	Primary product manufacturing	WES Industry Aggregation
ind_4	Secondary product manufacturing	WES Industry Aggregation
ind_5	Capital intensive tertiary manufacturing	WES Industry Aggregation
ind_6	Construction	WES Industry Aggregation
ind_7	Transportation, warehousing, wholesale	WES Industry Aggregation
ind_8	Communication and other utilities	WES Industry Aggregation
ind_9	Retail trade and consumer services	WES Industry Aggregation
ind_10	Finance and insurance	WES Industry Aggregation
ind_11	Real estate, rental and leasing operations	WES Industry Aggregation
ind_12	Business services	WES Industry Aggregation
ind_13	Education and health services	WES Industry Aggregation
ind_14	Information and cultural industries	WES Industry Aggregation

Table 3. Employee Variables

Variables	Description	Questions
Dependent Variables:		
len_crs	Length of classroom training course	Q25 (b)(ii): How long was the course? Last course + Second most recent course.
len_otj	Length of on-the-job training course	Q25 (d)(ii): In the past twelve months, how much time in total was spent for on-the-job training?
Independent Variables:		
tenure	Length of working in this company	Q1: When did you start working for this employer?
emp_sal	Employee's salary	Q35: In your job, what is your usual wage or salary before taxes and other deductions?
PT	Binary variable. Equals 1 if this employee is part-time worker (weekly working hours < 30)	Q10 (a) + Q10(d): Excluding all overtime, how many paid hours do you usually work per week at this job?
age_grp	Categorical variable for age group: 1. <25 2. 25-34 3. 35-44 4. 45-54 5. >= 55	Q43: In what year were you born?
women	Binary variable if this employee is female.	Q44: Gender?
children	Binary variable if this employee has any child.	Q53: Do you have any dependent children?

(Continued on next page)

Table 3. Continued

Variables	Description	Questions
imgr	Binary variable if this employee is immigrant to Canada.	Q46: Were you born in Canada? Q46 (a): In what year did you immigrate to Canada?
married	Binary variable if this employee is married or living with common-law partner.	Q51: What is your current legal marital status? Q52: Are you currently living with a common-law partner?
term	Binary variable if this employee is not permanent employee	Q15: Which of the following best describes your terms of employment in this job?
cba	Binary variable if this employee is covered by collective bargaining agreement.	Q33: In your job, are you a member of a union or covered by a collective bargaining agreement?
vm	Binary variable if this employee is visible minority.	Q55: Canadians come from many ethnic, cultural and racial backgrounds. From which groups did your parents or grandparents descend?
sch_yr	Education level presented by years of school attended.	Q48: Did you graduate from high school? Q49: Have you received any education in the past twelve months? Q50: What was that education?
ocp1	Dummy variable. Equals 1 if the occupation is Managers.	WES occupation groups. Mapped from SOC91 4 digit to 2 digit based on skills and education.
ocp2	Professionals	WES occupation groups.
ocp3	Technical/Trades	WES occupation groups.
ocp4	Marketing/Sales	WES occupation groups.
ocp5	Clerical/Administrative	WES occupation groups.
ocp6	Production workers with no trade/certification, operation and maintenance	WES occupation groups.

Chapter 4 Empirical Results

4.1 Preliminary Analysis

The descriptive statistics for employer and employee variables used in the estimations are in the Appendix. The Heckman two-step selection model does not allow applying weight. However, due to Statistics Canada's disclosure regulations, releasing descriptive statistics tables are required to be properly weighted. Therefore, in the descriptive statistics, variables used in employer panel data estimation are weighted by workplace final weight. As for variables used in the linked estimation, employer characteristics are weighted by workplace link weight while employee variables are finished by employee final weight. It is worth noting that by referring to Lohr (1999), if the model does describe the mechanism generating the data, then the finite population quantity B should be close to the theoretical parameter β. Thus, we would expect the point estimate of β using the model should be similar to the point estimate $\hat{B}$ calculated using sampling weights.

The means of each year's training expenditure per employee is calculated by independent variables.[2] Large size companies (more than 250 employees) invest much more in training than small size firms (less than 75 employees) do. The average training expenditures in large firms are above 500 dollars per employee while small firms only invest less than 200 dollars from the year 1999 to 2005. However, large firms showed no sign of increasing trend in the average training expenditure while small companies' training expenditure per employee were climbing up over years.

[2] These tables are available in Appendix.

Table 4. Means of Training Expenditure by Establishment Size, year 1999 to 2005

Firm Size	Year						
	1999	*2000*	*2001*	*2002*	*2003*	*2004*	*2005*
0 - 74	147.35	144.58	148.54	145.07	164.37	185.09	174.90
75 - 250	293.49	340.36	304.76	317.78	330.62	351.28	344.15
> 250	572.18	558.96	664.37	671.77	590.4	562.43	507.75

(weighted by workplace final weight)

Training expenditure does seem to be higher in those workplaces that provide innovation and new technology, as compared to their counterparts. The computer use variable represents the ratio of computer use employees to the total employment. We firstly calculate the mean of the total population, and then divide all the observations into two groups: lower-than-mean and greater-than-mean. Same procedure is applied to other ratio variables such as organizational change, new hire employees, turnover rate, incentives plan, and union coverage. We find that for most of these ratio variables, the greater-than-mean groups are related to more investment in training, except for new hire employees and turnover rate. Technology cost and non-wage benefit per employee also seem to be positively linked to training expenditure.

When looking at length of training, classroom and on-the-job training are examined separately. Longer tenure is linking to fewer hours of both trainings. Employees who receive higher salary are having more hours of training. Part-time workers are trained less regarding both trainings while temporary employees do not have that prevalent disadvantage in training

intensity. The influence of family responsibilities such as marriage and children seem to have a vague trend in affecting training receipt. Gender effect also needs further investigation.

4.2 Estimation Findings

4.2.1 The Provision of Training

The training determinants estimation results from Heckman procedure are illustrated here in table 5. We divide the population by total employment number, and make it into two subsets. One for small company that has less than 75 employees, and the other one is for large company with more than 250 employees. Classroom training is estimated separately. Since on-the-job training does not incur extra training expenditure, we also did estimation without distinguishing between classroom and on-the-job training.

In this thesis, a mixed effect regarding the provision of training is found for unionization. More union coverage in firms increases the possibility of providing job training for both classroom and on-the-job training. This confirms that collective bargaining agreements entail training (Zwick 2006; Boheim and Booth 2004; Zwick 2004b). Yet, more employees covered by collective bargaining agreement do not make all firms to invest more in training. Our findings show that unionization has a positive but insignificant linkage with large firms' training intensity. Small firms, to the contrary, significantly reduce training expenditure. This finding differs from previous WES research conducted by Turcotte, Leonard, and Montmarquette (2003). But it is consistent with evidence found in US establishments by Frazis, Gittleman and Joyce (2000).

Table 5. The Provision of Training, Heckman Two-step Selection Results (1999-2005)

	Small Firms				Large Firms			
	total employees: 0 - 75 (obs: 15, 239)				total employees: > 250 (obs: 2, 689)			
	Classroom		Any (Clsr + otj)		Classroom		Any (Clsr + otj)	
Variables	Coef.	z-values	Coef.	z-values	Coef.	z-values	Coef.	z-values
trng_exp								
n_hire	7.45	0.70	-5.32	-1.10	14.57	0.20	-65.23	-0.44
profit	0.00	4.33**	0.00	4.05**	0.00	-1.57	-0.0002	-0.87
wage	0.01	19.91**	0.01	24.86**	0.01	6.82**	0.01	3.45**
hrm	-336.39	-4.78**	-147.54	-2.83**	69.41	0.73	141.42	0.71
incens	-123.69	-1.77**	12.96	0.28	22.28	0.23	-14.12	-0.07
benefit	-0.0007	-0.25	0.01	3.19**	0.01	2.48*	0.01	0.82
union	-119.14	-3.02**	-68.61	-2.38**	16.54	0.27	18.42	0.14
tech_cost	0.0001	1.26	0.00	1.76*	0.00	0.77	0.00	0.34
_cons	730.24	12.36**	317.94	10.40**	306.15	3.19**	200.06	1.13
clsr_trng			***trng***		***clsr_trng***		***trng***	
prof_tech	0.35	9.78**	0.21	5.36**	0.20	1.14	0.59	1.74*
cpu	0.17	5.21**	0.17	4.85**	0.40	2.86**	0.20	0.78
tech	0.25	8.73**	0.32	9.48**	0.09	1.05	0.11	0.68
org_chg	1.34	14.15**	1.96	16.41**	0.78	3.08**	0.62	1.28
innovs	0.22	8.99**	0.34	12.32**	0.15	1.82*	0.29	1.92*
n_hire	0.06	6.12**	0.19	10.35**	-0.02	-0.24	1.48	2.96**
profit	-1.74E-08	-0.44	6.30E-09	0.13	-1.36E-07	-0.72	2.14E-09	0.00
wage	4.20E-07	1.53	-1.23E-06	-4.13**	5.69E-07	0.22	1.48E-06	0.28
turnover	-0.05	-7.36**	-0.05	-5.48**	0.04	0.34	-0.42	-1.79*
hrm	0.95	12.79**	1.30	12.58**	0.07	0.44	-0.21	-0.67
incens	0.73	11.53**	0.89	11.46**	-0.08	-0.50	0.08	0.24
benefit	0.00	12.58**	0.00	11.15**	-6.48E-06	-0.80	0.00	1.31
union	0.29	7.26**	0.37	8.19**	0.25	2.24**	0.20	0.97

(Continued on next page)

Table 5. Continued

	Small Firms				Large Firms			
	total employees: 0 - 75 (obs: 15, 239)				total employees: > 250 (obs: 2, 689)			
	Classroom		Any (Clsr + otj)		Classroom		Any (Clsr + otj)	
Variables	Coef.	z-values	Coef.	z-values	Coef.	z-values	Coef.	z-values
ind_2	-0.73	-9.62**	-0.31	-4.03**	-0.48	-2.3**	-0.27	-0.66
ind_3	-0.52	-6.48**	-0.20	-2.39**	-0.01	-0.04	-0.08	-0.19
ind_4	-0.35	-4.69**	-0.11	-1.35	-0.35	-1.51	-0.60	-1.42
ind_5	-0.58	-7.93**	-0.37	-4.82**	-0.08	-0.38	-0.18	-0.41
ind_6	-0.24	-3.8**	-0.07	-1.00	-0.52	-1.51	-1.20	-2.25*
ind_7	-0.22	-3.44**	-0.06	-0.86	-0.19	-0.88	-0.22	-0.53
ind_8	-0.31	-4.39**	-0.17	-2.31**	-0.82	-3.56**	0.04	0.08
ind_9	-0.28	-4.31**	-0.02	0.28	-0.27	-0.93	-0.16	-0.28
ind_10	0.02	0.32	-0.12	1.55	0.16	0.53	-0.02	-0.04
ind_11	-0.37	-5.28**	-0.14	-1.85*	-0.01	-0.02	4.22	.
ind_12	-0.27	-4.02**	-0.02	-0.28	-0.25	-1.16	-0.03	-0.06
ind_13	-0.38	-5.37**	-0.29	-3.91**	-0.12	-0.31	4.15	.
ind_14	-0.49	-6.15**	-0.23	-2.71**	-0.69	-3.15**	-0.47	-1.08
_cons	-0.47	-7.81**	-0.07	-1.03	1.17	5.06**	1.51	3.1**
mills								
lambda	-540.31	-9.77**	-437.33	-9.73**	-1161.951	-3.79**	-2472.31	-1.62
rho	-0.52449		-0.50328		-1		-1	
sigma	1030.1663		868.964		1161.9513		2472.308	
lambda	-540.31		-437.33		-1161.951		-2472.31	

* significant at 10 percent, and ** significant at 5 percent

Non-wage benefit expenditure per employee, payroll per employee (wage) and profit per employee are found having quite similar results regardless of training type and firm size. Non-wage benefit expenditure per employee barely has any influence for both training incidence and intensity although it is only significant for small size samples. Payroll per

employee and profit per employee also have little impact on training incidence and intensity. This result is somehow different from the finding of Cloutier, Renaud, and Morin (2008), which detected a positive effect on the probability of sponsoring classroom training. However, our study provides investigations in both training incidence and intensity with seven years' data while Cloutier, Renaud, and Morin (2008) only use 1999 survey data to examine the training probability. To interpret the result, there are some discussions that, although employers sponsor training of their employees, they actually shift the costs of the training in some ways to the employee such as reduced wage or benefit. It might be the scenario that benefit, wage or profit, are not the determinants of training. Instead, they may be the results of training impact.

Our hypothesis is supported by the fact that high turnover rate reduces training probability. This works for both classroom training and on-the-job training. And it does not show any difference between small size and large size companies. This finding is in line with what Frazis, Gittleman, and Joyce (2003) have found. It also contributes to the current WES studies by examining the turnover effect in term of classroom training.

Similar to Zwick and Kuckulenz (2005), hiring new employees increase the training incidence for all types of training in our research. Consequently, the training expenditure for classroom training is also increased. New hire variable has greater impact on large companies than small ones, although it is insignificant for both. This finding justified our hypothesis

that new hire would induce the training incidence and intensity as new employees would need more training to get familiar with organization and job tasks.

Locations that have introduced new technologies, or innovated new product and new process are positively associated with training decision, but only significant for small firms. The technology cost does not show any substantial impact on training. The share of computer users, however, also correlates with higher training possibility. Although it is insignificant when we do not specify training type, large firms' classroom training is having the greatest impact from this variable. This group of variables could be seen as a proxy for technological investment. If a firm engages in those investments, the current employees certainly would expect training courses to adapt to the new working equipments. It is generally in line with earlier research of Wannell and Ali (2002). And it fills the research gap of Zeytinoglu, Cooke, and Jiao (2005) regarding classroom training. Besides, Cloutier, Renaud, and Morin (2008) found similar results by examining the determinants of the proportion of employees trained. Our study focuses on the training expenditure per employee as the training intensity. The hypothesis that technological investments induce more training than the counterpart is also well supported.

More professional and technical workers indeed increase the training probability, but not significant for large firm's classroom training. This trend is similar as what have found in the previous literature of Booth and Zoega (2000) and Zwick's (2004a, 2006).

Organizational change is found to have a positive effect on the training possibility. Especially for the small firms, experiencing some changes at organizational level greatly increased the training incidence, as compared to large organizations.

Human Resource practices are reported in literature as having a positive effect on training (Huselid, 1995; Whitfield, 2000). However, our study shows that it is not the case for all firms. Training seems to be an alternative to Human Resource practices in small firms while it works as complementary in large firms.

Most industries are having a negative impact on the provision of training. Except that finance and insurance sectors has a positive relationship with classroom training incidence and some services sectors (Communication and other utilities, Real estate, rental and leasing operations, and Education and health services) have positive linkage when on-the-job training is also counted. This result is replicated from what Turcotte, Leonard, and Montmarquette (2003) have found. It is reasonable that services sectors require more experience to conduct business with client face-to-face. This skill can be acquired most efficiently by watching and learning on the site.

4.2.2 The Receiving of Training

With the inclusion of employee characteristics, the receiving of training is studied considering both workplace and individual effects.

Table 6. The Receiving of Training, Heckman Two-step Selection Results (1999-2004)

	1999 - 2000				2001 - 2002			
	Classroom		On-the-job		Classroom		On-the-job	
	(obs: 42, 600)		(obs: 42, 533)		(obs: 34, 743)		(obs: 34, 625)	
Variables	Coef.	z-values	Coef.	z-values	Coef.	z-values	Coef.	z-values
len_crs			***len_otj***		***len_crs***		***len_otj***	
ocp2	3.07	1.25	0.73	0.36	1.10	0.4	0.86	0.36
ocp3	-1.09	-0.48	3.93	2.13**	-3.47	-1.33	-2.85	-1.29
ocp4	-9.41	-2.29**	-6.54	-2.02**	-5.74	-1.3	-12.67	-3.5**
ocp5	-4.66	-1.78*	-1.58	-0.73	-7.20	-2.41**	-4.08	-1.60
ocp6	-8.19	-2.42**	-4.28	-1.55	-13.41	-3.64**	-10.06	-3.21**
married	-1.66	-1.02	-1.42	-1.06	0.21	0.12	-3.45	-2.37**
children	0.35	0.26	2.02	1.80*	-1.99	-1.37	-1.44	-1.16
term	-8.37	-3.05**	-6.78	-2.98**	-5.17	-1.87*	-3.21	-1.38
sch_yr	0.98	2.54**	0.16	0.5	1.47	3.54**	0.45	1.26
emp_sal	0.00	0.89	0.00	1.82*	0.00	0.94	0.00	1.28
cba	-9.19	-6.06**	-4.30	-3.40**	-3.29	-2.05**	-5.79	-4.19**
tenure	-0.30	-3.84**	-0.45	-6.79**	-0.34	-4.21**	-0.54	-7.68**
women	4.04	2.89**	0.12	0.10	1.03	0.70	-5.21	-4.10**
_cons	24.31	3.86**	25.59	4.96**	13.90	2.01**	33.29	5.73**
clsr_trng			***otj_trng***		***clsr_trng***		***otj_trng***	
prof_tech	0.30	10.80**	0.07	2.41**	0.36	12.07**	0.07	2.40**
ttl_emp	0.00	20.72**	0.00	9.91**	0.00	28.34**	0.00	17.17**
cpu	0.18	9.16**	0.04	2.17**	0.26	9.88**	0.06	2.12**
tech	0.27	17.15**	0.22	14.02**	0.24	11.82**	0.19	9.13**
org_chg	1.50	30.83**	1.37	27.92**	1.42	22.84**	1.58	23.42**
innovs	0.22	13.72**	0.27	16.70**	0.19	10.50**	0.26	14.05**
n_hire	0.00	0.52	0.02	2.51**	0.07	6.09**	0.07	5.82**
profit	0.00	8.14**	0.00	4.20**	0.00	3.61**	0.00	1.76*

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Table 6. Continued

	1999 - 2000				2001 - 2002			
	Classroom		On-the-job		Classroom		On-the-job	
	(obs: 42, 600)		(obs: 42, 533)		(obs: 34, 743)		(obs: 34, 625)	
Variables	Coef.	z-values	Coef.	z-values	Coef.	z-values	Coef.	z-values
wage	0.00	4.54**	0.00	3.18**	0.00	-3.26**	0.00	-5.23**
hrm	0.66	16.92**	0.42	11.03**	0.62	13.00**	0.68	13.06**
incens	0.26	7.22**	0.27	7.35**	0.46	12.14**	0.52	12.63**
benefit	0.00	14.51**	0.00	7.93**	0.00	13.82**	0.00	11.71**
union	0.69	29.12**	0.63	26.41**	0.52	20.89**	0.45	17.51**
turnover	-0.03	-4.38**	-0.01	-2.05**	-0.09	-7.99**	-0.02	-1.9*
age_grp	-0.01	-1.03	-0.01	-2.10**	-0.01	-1.69*	-0.03	-4.28**
ocp2	0.18	6.33**	0.21	7.31**	0.28	8.46**	0.20	6.04**
ocp3	0.16	7.10**	0.17	7.45**	0.21	8.23**	0.16	5.9**
ocp4	0.12	2.85**	0.27	6.17**	0.13	2.77**	0.19	3.92**
ocp5	0.12	4.64**	0.15	5.62**	0.18	5.95**	0.22	6.99**
ocp6	0.21	5.93**	0.23	6.33**	0.34	8.76**	0.25	6.09**
vm	-0.08	-2.87**	0.08	2.92**	0.00	0.10	0.02	0.75
sch_yr	0.02	5.07**	0.01	2.65**	0.01	2.17**	0.01	1.88*
PT	-0.22	-8.72**	-0.18	-7.08**	-0.28	-11.09**	-0.20	-7.66**
imgr	-0.14	-6.23**	-0.07	-3.04**	-0.14	-5.96**	-0.07	-2.59**
ind_2	-0.25	-5.47**	-0.13	-2.81**	-0.39	-7.23**	0.11	2.05**
ind_3	-0.05	-1.06	0.05	1.10	-0.27	-4.81**	0.18	3.32**
ind_4	-0.09	-1.82*	-0.02	-0.42	-0.31	-5.53**	0.25	4.61**
ind_5	-0.27	-5.79**	-0.11	-2.48**	-0.48	-9.22**	0.07	1.44
ind_6	-0.20	-4.85**	-0.23	-5.56**	-0.36	-7.21**	0.07	1.44
ind_7	0.14	3.42**	0.04	0.89	-0.06	-1.33	0.09	2.06**
ind_8	-0.13	-2.83**	-0.23	-4.86**	-0.26	-4.64**	0.07	1.25
ind_9	-0.05	-1.13	0.13	2.81**	-0.16	-3.18**	0.29	5.78**

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Table 6. Continued

	1999 - 2000				2001 - 2002			
	Classroom		On-the-job		Classroom		On-the-job	
	(obs: 42, 600)		(obs: 42, 533)		(obs: 34, 743)		(obs: 34, 625)	
Variables	Coef.	z-values	Coef.	z-values	Coef.	z-values	Coef.	z-values
ind_10	0.45	9.46**	0.19	4.07**	0.13	2.45**	0.30	5.68**
ind_11	-0.21	-4.45**	-0.38	-8.08**	-0.42	-7.64**	0.16	2.85**
ind_12	-0.04	-0.84	-0.01	-0.32	-0.23	-4.37**	0.22	4.29**
ind_13	-0.09	-1.99**	-0.20	-4.57**	-0.29	-5.69**	-0.03	-0.58
ind_14	-0.12	-2.41**	-0.10	-2.12**	-0.41	-7.52**	0.15	2.74**
_cons	-0.85	-11.35**	-0.26	-3.53**	-0.51	-5.95**	-0.30	-3.53**
mills								
lambda	-18.10	-7.52**	-13.81	-5.41**	-11.26	-4.39**	-16.71	-5.97**
rho	-0.16		-0.15		-0.11		-0.18	
sigma	110.77		95.16		105.46		95.37	
lambda	-18.10		-13.81		-11.26		-16.71	

* significant at 10 percent, and ** significant at 5 percent

Table 6. Continued

	2003 - 2004			
	Classroom		On-the-job	
	(obs: 36, 111)		(obs: 36, 028)	
Variables	Coef.	z-values	Coef.	z-values
len_crs			***len_otj***	
ocp2	-0.05	-0.02	1.25	0.59
ocp3	-3.99	-1.8*	-0.94	-0.49
ocp4	-8.10	-2.01**	-6.22	-1.86*
ocp5	-7.35	-2.84**	-3.62	-1.60
ocp6	-9.86	-2.76**	-3.54	-1.16

	2003 - 2004			
	Classroom		On-the-job	
	(obs: 36, 111)		(obs: 36, 028)	
Variables	Coef.	z-values	Coef.	z-values
len_crs			***len_otj***	
ocp2	0.27	9.02**	0.24	7.64**
ocp3	0.17	7.38**	0.19	7.64**
ocp4	0.10	2.27**	0.26	5.21**
ocp5	0.14	4.98**	0.22	7.50**
ocp6	0.12	3.10**	0.26	5.93**

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Table 6. Continued

	2003 - 2004			
	Classroom (obs: 36, 111)		On-the-job (obs: 36, 028)	
Variables	Coef.	z-values	Coef.	z-values
married	-2.36	-1.48	-2.30	-1.66*
children	0.52	-.39	0.83	0.72
term	-2.91	-1.05	-1.88	-0.79
sch_yr	1.15	2.95**	0.57	1.68*
emp_sal	0.00	-0.58	0.00	-0.70
cba	-5.51	-3.62**	-5.19	-3.93**
tenure	-0.26	-3.48**	-0.34	-5.22**
women	-0.13	-0.10	-3.15	-2.67**
_cons	20.12	3.09**	23.91	4.35**
clsr_trng			***otj_trng***	
prof_tech	0.29	10.23**	0.03	0.94
ttl_emp	0.00	8.77**	0.00	10.83**
cpu	0.13	5.05**	0.06	2.01**
tech	0.22	11.45**	0.18	8.59**
org_chg	1.40	23.70**	1.74	24.85**
innovs	0.17	9.94**	0.32	16.93**
n_hire	0.04	3.50**	0.15	9.19**
profit	0.00	0.60	0.00	3.00**
wage	0.00	-5.33**	0.00	-8.47**
hrm	0.74	17.40**	0.88	17.37**
incens	0.40	10.64**	0.33	7.77**
benefit	0.00	17.59**	0.00	14.08**
union	0.56	23.13**	0.47	17.72**
turnover	-0.01	-1.50	-0.03	-3.73**
age_grp	0.00	-0.02	-0.01	-2.48**

	2003 - 2004			
	Classroom (obs: 36, 111)		On-the-job (obs: 36, 028)	
Variables	Coef.	z-values	Coef.	z-values
vm	-0.09	-3.43**	-0.03	-0.92
sch_yr	0.03	5.90**	0.02	4.54**
PT	-0.33	-13.15**	-0.27	-10.14**
imgr	-0.07	-2.90**	-0.04	-1.62
ind_2	-0.17	-3.23**	-0.11	-1.89*
ind_3	-0.13	-2.40**	-0.03	-0.53
ind_4	-0.09	-1.74*	0.00	0.06
ind_5	-0.27	-5.17**	-0.18	-3.23**
ind_6	-0.26	-5.46**	-0.22	-4.47**
ind_7	0.05	1.13	-0.03	-0.52
ind_8	-0.29	-5.38**	-0.18	-3.12**
ind_9	-0.05	-0.96	0.18	3.37**
ind_10	0.29	5.63**	0.20	3.67**
ind_11	-0.25	-4.63**	-0.12	-2.16**
ind_12	-0.02	-0.46	0.15	2.81**
ind_13	0.02	0.32	-0.16	-2.97**
ind_14	-0.28	-5.39**	-0.13	-2.32**
_cons	-0.64	-7.76**	-0.23	-2.63**
mills				
lambda	-16.20	-5.92**	-18.69	-6.85**
rho	-0.16		-0.20	
sigma	100.44		92.77	
lambda	-16.20		-18.69	

* significant at 10 percent, and ** significant at 5 percent

For the first stage probit equation, we keep all the independent variables from previous estimation's first stage, while adding some individual factors. The empirical results of this estimation are shown here in above table 6. Although most of the workplace characteristics only experienced a slight change in term of coefficients, nearly all of them become significant. Several things are worth noting.

New hire still has a minor influence on training incidence in this linked model. But it is significant for all training types in all waves except for the first wave's classroom training.

Unionization turned out showing greater impact on training incidence compared to previous estimation. But the length of training is negatively associated with unionization. Turnover still presents significant negative relationship with the possibility of training, which supported our hypothesis as well. Our understanding is that since training is transferrable in some ways, when employers notice that there is high turnover rate, they would be cautious in sponsoring training to avoid the risk of having their trained employees hired away.

With respect to individual factors, age group variables show a significant but not strong negative impact on both classroom and on-the-job training occurrences. Employees with longer tenure also tend to receive less hours of training than newly employees. This effect is significant and substantial only for classroom training. One possible reason is that employees are getting familiar and stable with their job. Most people prefer not to change the job position if their tenure is relative long enough. In the meanwhile, the scope of family

responsibilities is enlarging such as getting a house to maintain, having children to take care. Older people turn to resist change. So the training incidence drops. School-year variable reveal that employees with higher education level are inclined to receive more training.

The results also suggest that employees, who immigrated to Canada, face disadvantages in access to training as compared to Canadian born workers. Classroom training seems to be more sensitive to this factor than on-the-job training. This is supplementary to the work of Zeytinoglu, Cooke and Jiao (2005) as they found that Aboriginals receive longer days of training compared to Whites. There are barriers for immigrants to receive training. Immigrants are new to Canada, their education background and work experience may not fit into Canadian workplace right away. Employers make the decision to train their workers only if they perceive the company would benefit from sponsoring the training. In that case, employers are consequently more cautious when hiring and offering training to immigrants. Visible minority workers are found to have mixed effects on training incidence. It has either negative but weak impact or no effect on training at all.

Part-time workers, as our hypothesis has predicted, are exposed to fewer training possibility other than full-time workers. The impact does not differ much between the two types of training. As explained in some literature, part-time workers have relative less hours working in the company, which rejects some training events automatically. Besides, some part-time workers are hired in positions that may not require high level skills. This could also be the reason of this phenomenon. Temporary workers are also receiving less hours of training.

Since they are on a short-term contract, it is of high possibility for temporary workers to quit their jobs. Employers are not likely to be willing to invest in training the short-term workers.

Again, employee salary still has no effect on training participation, although it is insignificant in our models. This is in accordance with our analysis obtained from the workplace estimation. While the existence of collective bargaining agreement in a firm act as a motivating factor for employer-provided training, being a union member for employee yet somehow significantly reduce the received hours of training, especially for classroom training.

Family responsibilities are affecting training intensity too. Empirical results show that married people are receiving less hours of training. But the presence of children is having a mixed effect from the year 1999 to 2004. This is somehow not quite in line with our hypothesis. In most studies, women are receiving less training than their male co-workers (Zeytinoglu, Cooke and Jiao, 2005; Cooke, Zeytinoglu and Chowhan, 2008). This is also the case in our estimation, especially starting from the year 2001. Gender has greater impact on otj training than classroom training.

The occupational group variables reveal that firms with a high proportion of professional, technical employees, administrative personnel and production workers significantly provide more training opportunities but only the professionals have a tendency to receive more training. This finding is supported in Baldwin and Johnson (1995)'s work.

We find similar result as Albert, Garcia-Serrano, and Hernanz (2010) that employees with higher education attainment are more likely to participate in training. This suggests strong complementarities between education and training: more educated workers are hired in jobs and industries with higher skill requirements and, since they have more learning capacity, they are more likely to qualify for training than less educated workers (Brunell, 2001).

Chapter 5 Conclusion

In this thesis, we conducted research using Statistics Canada's WES (1999 - 2005) data to examine the determinants of the provision of training and the receiving of training. Inspired by earlier literature, we tested some training predictors proposed in literature. Our analysis confirms results coming from employer-based surveys, such as the strong correlation between training and technological investments. Our research also studied training selection by linking WES employee data to workplace data. Some evidence from other household surveys is also replicated in our analysis.

First, we use WES workplace 1999 - 2005 longitudinal dataset to examine the provision of training. And we compare the findings for small size companies with those for large size firms. Previous studies show that some workplace characteristics (large firm, average payroll, innovation or new technologies, new hires, Human Resource practices, for example) increase the provision of training either in incidence or intensity (Cloutier, Renaud, and Morin, 2008; Zwick and Kuckulenz, 2005; Wannell and Ali, 2002; Booth and Zoega, 2000; Zwick's, 2004a, 2006; Huselid, 1995; Whitfield, 2000). Our findings suggest that profit, non-wage benefit and payroll are alternatives to training regardless of firm size. For both small size and large size firms, training will be reduced if firms are experiencing high turnover rate while more training will be provided if firms have larger proportion of professional and technical workers or undergo some organizational change. Apart from the above similarities we find, differences between small size and large size companies are also detected. Although

unionization increases training incidence, small firms reduce their training expenditure while large firms increase investment in training.

Second, we compare between classroom training and on-the-job training by using linked employer-employee datasets. Based on the estimation of the provision of training, the predictors of training incidence are controlled. Apart from those workplace characteristics, we also detect some individual traits that discourage employer to provide training. Part-time job, being a visible minority employee and people with older age are the barriers for employers to sponsor training. We get further results about the training selection provided that the differences in provision of training is taken into account. Generally, the receiving of classroom training and on-the-job training do not differ much regarding employee characteristics. Longer tenure and being married are the factors that preventing employees from getting more hours of training. This finding confirms the findings of Zwick and Kuckulenz (2005) and Zwick (2006). Although Wooden and VandenHeuvel (1997) found that training is in favour of women in Australia, gender effect also exists in Canada as women is reported to receive less training than their male co-worker. This is similar as what Zeytinoglu, Cooke, and Jiao (2005) and Cooke, Zeytinoglu, and Chowhan (2008) have found. The differences we find between classroom training and on-the-job training are that classroom training is more sensitive for immigrants and temporary workers. The negative effects are greater for classroom training than on-the-job training when those two variables are presented.

The most interesting finding in our study is regarding unionization. Although the finding of Zwick (2006), Boheim, and Booth (2004) and Zwick (2004b) is confirmed that collective bargaining agreements entail training, we find that unionization only encourage employers to provide more training opportunity. The number of training in hours is negative linked with unionization. This might suggesting that collective bargaining agreement only guarantee a large proportion of employees having the training opportunity while training intensity cannot be promised.

Overall, the findings are consistent with the theories presented in the emerging researches. Our results also add some contributions to the current literature. But there are certainly limitations in our study. First, due to the data structure, we can only investigate employees who have been followed in the same workplace for two consecutive years starting by 1999, 2001 or 2003. The quit workers or the employees that only been surveyed once are automatically cancelled out. Nonetheless, those observations should also reveal some insight into training theories.

Second, we only tested employee's wage effect on training due to the availability. Yet we found no correlation between wage and training. With available data, further research can work on examine the relationship between employees' earning growth and receiving of training. Pischke (2001) finds that selection in training seems not to be based on wage levels but rather on earnings growth. Theoretically, employers are more likely to train those

employees who demonstrate ability to contribute and potential development. Earnings growth, rather than wage, works better as a proxy for that.

Third, with the region variables being unavailable, we cannot examine the regional impact on training. Yet this should be interesting as Canada has such a wide geographic scope, with each province has its own advantages and disadvantages in certain industries. The correlation of industry and region is theoretically substantial.

Appendix A

Descriptive Statistics

Employer_Employee Linked 1999-2004						
Variables	*1999-2000*		*2001-2002*		*2003-2004*	
	Mean	**SD**	**Mean**	**SD**	**Mean**	**SD**
len_crs	16.99	103.17	14.14	88.90	14.02	87.51
len_otj	15.40	81.19	15.60	91.55	14.26	86.28
ocp1	0.14	0.35	0.11	0.32	0.13	0.33
ocp2	0.16	0.36	0.16	0.37	0.16	0.37
ocp3	0.39	0.49	0.40	0.49	0.40	0.49
ocp4	0.08	0.27	0.08	0.27	0.07	0.26
ocp5	0.14	0.34	0.13	0.33	0.14	0.35
ocp6	0.07	0.25	0.07	0.26	0.06	0.24
married	0.72	0.45	0.71	0.46	0.72	0.45
children	0.48	0.50	0.47	0.50	0.46	0.50
term	0.07	0.25	0.07	0.25	0.06	0.24
sch_yr	13.43	2.04	13.33	1.94	13.49	1.94
emp_sal	18317.75	27316.18	18833.62	31080.65	14156.15	29043.29
cba	0.27	0.44	0.24	0.43	0.25	0.43
tenure	8.57	8.25	8.08	8.10	8.52	8.45
women	0.53	0.50	0.51	0.50	0.53	0.50
age_grp	2.84	1.37	2.79	1.40	2.87	1.43
vm	0.11	0.31	0.13	0.33	0.13	0.34
PT	0.17	0.38	0.19	0.40	0.18	0.39
imgr	0.17	0.38	0.19	0.39	0.19	0.39
clsr_trng	0.39	0.49	0.39	0.49	0.43	0.50
otj_trng	0.53	0.50	0.55	0.50	0.58	0.49
prof_tech	0.23	0.31	0.23	0.31	0.24	0.32
ttl_emp	26.45	132.99	28.36	116.94	31.90	172.04
cpu	0.49	0.63	0.54	0.40	0.55	0.40

tech	0.27	0.44	0.17	0.38	0.17	0.38
org_chg	0.10	0.15	0.07	0.12	0.06	0.12
innovs	0.39	0.49	0.35	0.48	0.33	0.47
n_hire	0.30	0.91	0.27	0.57	0.30	0.78
profit	40898.50	184364.9	32230.45	200569.9	26275.92	158698.8
wage	27540.22	18189.40	30513.39	24146.90	31898.90	24363.12
hrm	0.06	0.17	0.05	0.15	0.05	0.16
incens	0.10	0.20	0.10	0.20	0.09	0.19
benefit	1229.51	2549.35	1474.70	2970.30	1724.80	3204.44
union	0.07	0.22	0.10	0.26	0.08	0.23
turnover	0.28	0.91	0.28	0.61	0.29	0.79
ind_1	0.02	0.13	0.01	0.11	0.01	0.11
ind_2	0.03	0.18	0.03	0.18	0.03	0.17
ind_3	0.01	0.12	0.02	0.13	0.01	0.11
ind_4	0.02	0.14	0.02	0.15	0.02	0.15
ind_5	0.03	0.17	0.04	0.19	0.03	0.18
ind_6	0.07	0.25	0.07	0.25	0.07	0.25
ind_7	0.13	0.33	0.12	0.32	0.11	0.32
ind_8	0.01	0.10	0.01	0.12	0.01	0.11
ind_9	0.32	0.47	0.31	0.46	0.31	0.46
ind_10	0.06	0.24	0.06	0.23	0.06	0.23
ind_11	0.03	0.18	0.03	0.18	0.04	0.20
ind_12	0.11	0.31	0.12	0.32	0.12	0.33
ind_13	0.14	0.35	0.14	0.35	0.14	0.35
ind_14	0.02	0.15	0.02	0.15	0.02	0.15

(employer characteristics are weighted by workpalce link weight; employee variables are weighted by employee final weight)

Appendix B

Means of Training Expenditure by Industry, 1999-2005

	Year						
Industry	*1999*	*2000*	*2001*	*2002*	*2003*	*2004*	*2005*
1	194.51	198.15	176.99	262.43	337.09	402.49	353.72
2	90.01	114.88	72.92	131.14	111.47	119.09	134.56
3	229.15	263.17	238.33	162.16	210.70	267.88	228.31
4	108.25	201.41	291.05	244.58	210.82	196.58	201.52
5	269.18	239.39	170.56	242.32	334.11	175.38	148.02
6	137.11	162.22	139.76	141.82	125.45	262.16	176.32
7	213.10	213.37	184.15	152.16	164.50	170.20	178.02
8	336.06	305.64	232.48	371.01	361.53	417.75	373.88
9	72.11	74.76	98.02	89.33	79.84	134.56	113.44
10	439.42	463.69	377.92	304.75	442.91	412.27	401.35
11	142.57	68.91	145.92	111.71	94.22	121.81	138.74
12	157.42	167.25	167.93	225.37	253.10	210.07	215.85
13	147.36	80.46	125.61	108.34	195.50	183.05	226.44
14	130.74	258.60	314.28	206.92	334.52	226.19	174.74

(weighted by workplace final weight)

Appendix C

Means of Training Expenditure by other workplace characteristics, 1999-2005

		Year						
Variables	value	*1999*	*2000*	*2001*	*2002*	*2003*	*2004*	*2005*
innovs	0	98.80	90.53	116.79	110.46	119.74	133.18	136.33
	1	225.06	260.25	222.01	278.70	275.62	321.24	226.44
tech	0	109.86	94.31	126.84	121.40	142.90	166.76	156.77
	1	260.87	339.84	293.14	338.33	308.18	321.03	335.08
cpu	< 0.53	104.16	80.63	105.07	106.44	106.57	113.66	104.54
(0.53)	>= 0.53	213.38	241.70	210.73	198.51	236.28	266.15	260.27
org_chg	< 0.06	94.30	71.32	98.49	91.36	133.92	142.38	135.47
(0.06)	>= 0.06	220.94	282.45	269.84	324.54	250.68	311.41	284.94
n_hire	< 0.3	158.18	158.02	155.32	165.30	180.94	208.74	165.11
(0.3)	>= 0.3	143.04	140.08	156.16	122.89	148.66	150.87	220.64
turnover	< 0.28	.	.	171.77	161.79	184.61	190.16	176.22
(0.28)	>= 0.28	153.38	152.15	120.96	131.85	139.75	194.82	193.72
hrm	< 0.037	120.04	152.15	129.70	152.38	142.34	191.42	154.73
(0.037)	>= 0.037	293.59	.	280.98	.	340.47	.	323.38
incens	< 0.076	.	.	78.27	152.38	91.24	191.42	109.68
(0.076)	>= 0.076	153.38	152.15	276.65	.	310.93	.	305.46
benefit	< 1275	106.49	88.40	117.82	104.49	108.24	130.18	129.14
(1275)	>= 1275	302.50	344.55	279.95	287.51	344.12	340.41	291.61
union	< 0.07	144.02	143.27	142.10	138.73	162.50	181.03	170.96
(0.07)	>= 0.07	268.01	274.51	267.45	228.91	223.21	285.49	283.67
tech_cost	< 8218	127.27	110.85	139.14	137.99	157.19	176.14	166.38
(8218)	>= 8218	299.14	472.88	357.69	382.45	398.35	383.94	391.53

(weighted by workplace final weight) Note: Mean value in parentheses

Appendix D

Means of Training Length by employee characteristics, 1999-2000

Variables		Classroom		On-The-Job	
(mean)	value	1999	2000	1999	2000
tenure	< 8.57	17.23	16.70	18.25	19.09
(8.57)	>= 8.57	20.31	14.23	12.11	9.56
emp_sal	< 18317	14.87	12.94	15.21	11.57
(18317)	>= 18317	24.61	19.96	17.30	20.22
Part-time	0	19.70	17.70	16.31	16.74
	1	11.05	6.40	14.07	6.57
age_grp	1	10.51	10.81	25.42	22.47
	2	27.05	17.10	20.53	18.86
	3	17.59	19.87	15.73	18.14
	4	12.63	15.94	11.77	11.01
	5	17.38	7.18	8.05	5.48
women	0	15.22	13.77	17.65	16.75
	1	21.22	17.24	14.46	13.13
immigration	0	18.55	16.28	15.91	14.55
	1	17.57	12.17	16.20	16.33
married	0	16.12	13.60	18.09	19.80
	1	19.28	16.33	15.12	13.04
children	0	16.76	13.23	17.13	15.30
	1	20.18	18.06	14.68	14.37
occupation	1	18.25	16.27	14.10	16.02
	2	31.50	25.12	16.46	21.07
	3	17.66	15.74	17.31	18.05
	4	12.78	5.95	16.28	4.10
	5	15.68	10.87	14.41	11.32
	6	5.19	27.32	13.97	13.09

term	0	19.14	15.50	15.98	15.26
	1	8.30	17.19	15.74	8.35
cba	0	18.74	14.94	16.63	15.91
	1	17.40	17.47	14.15	11.82
vm	0	18.47	15.30	15.39	14.49
	1	17.66	18.21	20.65	17.95
education	0	6.95	10.81	16.75	8.02
	1	14.54	9.22	15.79	12.48
	2	14.69	15.96	14.63	16.54
	3	26.34	20.76	15.53	12.48
	4	22.11	17.14	17.77	22.42

weighted by employee final weight

Appendix E

Means of Training Length by employee characteristics, 2001-2002

Variables		Classroom		On-The-Job	
(mean)	value	2001	2002	2001	2002
tenure	< 8.08	17.83	14.01	23.01	14.72
(8.08)	>= 8.08	14.29	8.60	11.96	8.37
emp_sal	< 18833	11.80	8.18	16.46	7.33
(18833)	>= 18833	25.51	17.90	24.36	20.25
Part-time	0	18.28	13.69	21.60	14.36
	1	8.02	4.72	6.99	3.77
age_grp	1	18.95	9.98	27.10	15.33
	2	18.74	15.90	30.89	17.75
	3	14.02	12.25	17.75	12.39
	4	19.53	8.95	13.28	9.64
	5	8.81	7.48	6.97	4.18
women	0	16.76	11.62	21.46	14.52
	1	16.49	11.71	17.09	9.50
immigration	0	16.84	12.25	18.47	12.30
	1	15.75	9.16	22.37	10.53
married	0	17.70	9.19	23.99	14.64
	1	16.16	12.65	17.16	10.90
children	0	20.19	12.32	23.04	11.56
	1	12.44	10.94	14.77	12.41
occupation	1	24.17	15.11	20.65	23.70
	2	31.29	21.43	29.92	17.35
	3	14.60	11.76	17.04	12.23
	4	4.66	6.75	6.81	6.72
	5	12.69	10.37	19.80	9.82
	6	6.16	6.20	19.69	4.31

term	0	16.87	12.06	19.78	12.25
	1	13.55	5.68	12.52	7.77
cba	0	17.14	10.53	21.19	12.90
	1	15.04	15.28	13.26	9.00
vm	0	16.37	11.86	18.18	12.15
	1	18.41	10.32	26.59	10.66
education	0	6.01	4.15	8.45	3.81
	1	9.01	6.05	19.76	9.57
	2	21.33	13.15	14.83	13.14
	3	19.83	13.33	23.54	14.84
	4	22.31	17.65	25.53	13.62

weighted by employee final weight

Appendix F

Means of Training Length by employee characteristics, 2003-2004

Variables		Classroom		On-The-Job	
(mean)	value	2003	2004	2003	2004
tenure	< 8.52	17.84	11.89	19.83	13.10
(8.52)	>= 8.52	15.72	9.69	13.44	8.04
emp_sal	< 14156	16.81	9.08	17.23	9.01
(14156)	>= 14156	18.12	16.66	18.94	16.81
Part-time	0	17.36	13.03	19.61	13.32
	1	15.74	3.12	6.95	1.90
age_grp	1	16.52	8.81	21.01	12.95
	2	24.65	11.92	20.36	13.60
	3	16.84	12.55	17.58	13.04
	4	15.96	10.95	15.10	8.67
	5	11.13	4.86	9.20	5.26
women	0	16.30	11.94	19.82	11.88
	1	17.81	10.06	15.68	10.07
immigration	0	17.72	10.37	18.15	11.55
	1	14.46	13.49	15.28	8.07
married	0	14.64	8.40	20.61	9.26
	1	18.12	11.89	16.38	11.54
children	0	18.83	9.85	17.53	11.63
	1	15.12	12.19	17.71	10.09
occupation	1	16.10	18.16	16.94	13.36
	2	31.67	17.38	21.24	14.95
	3	17.11	11.68	16.21	12.76
	4	6.12	5.35	24.29	4.56
	5	10.28	7.29	16.99	10.49
	6	12.13	3.25	11.98	6.49

term	0	16.77	11.09	18.39	10.56
	1	21.56	8.36	7.34	16.93
cba	0	17.74	10.71	17.90	10.88
	1	15.25	11.68	16.77	11.02
vm	0	18.00	11.02	16.83	11.50
	1	11.12	10.36	22.87	6.94
education	0	5.06	3.36	11.45	6.98
	1	7.25	6.26	18.03	10.35
	2	20.85	9.82	17.42	8.98
	3	21.63	14.11	17.69	11.45
	4	22.60	14.83	20.94	14.54

weighted by employee final weight

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